**STREAM TABLE AND OCEAN DEPTHS**

LAB REPORT – 67 pts.

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Group #: \_\_\_\_\_\_\_\_

Period: \_\_\_\_\_\_\_\_

**OBJECTIVE:** To identify various characteristics of streams and recognize ocean floor features.

**QUESTION:** How can you represent stream features and ocean floor characteristics in a lab setting?

**HYPOTHESIS:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **(1 pt.)**

**MATERIALS:**

* Stream table
* Sand
* Metric ruler
* Calculator
* Sink
* Disposal bucket
* Tubular attachment
* Propping objects
* 2 miniature houses
* Modeling clay
* Plastic spoon
* Stopwatch
* Box with seafloor model
* Probing device
* Scissors
* 10 graph paper grids per student
* Colored pencils
* 1 lab report sheet per student

**INTRODUCTION:**

When a river or stream winds back and forth, it develops bends known as **meanders**. The beginning of a stream is known as the **head** of the stream and where the stream empties itself into a larger body of water is known as the **mouth**. Three factors affecting a stream’s ability to erode it’s channel include the **stream load**, or what the stream is carrying, **discharge**, the volume of water moved by a stream in a given period, and **gradient**, or the change in elevation of a stream over a given distance.

**PROCEDURE:**

1. Begin this lab by teaming up with the lab group next to yours. For example 🡪 Group 1 and 2 will work together, Group 3 and 4, Group 5 and 6, and Group 7 and 8.
2. Make sure your stream table is filled with sand leaving the bottom 10 cm. (the end with the drainage hole) empty for runoff. Level the sand to create a smooth all-around surface.
3. Using the propping objects you were given, prop the end of your stream table (the end without the drainage hole) about 5 to 10 cm above the lab table. Align the end with the drainage hole along the edge of your lab station sink.
4. Place the disposal bucket directly beneath the drainage hole inside of the lab station sink And secure the tubular attachment to your faucet on your lab station sink.
5. Place the tube at the head of your stream, its starting point 🡪 the end propped in the air. Turn your faucet on very slowly and observe the small stream beginning to develop in the sand within your stream bed. Draw what you see in the diagram box below in full detail and color. **(2 pts.)**
6. Cut off the water flow to your stream by turning the faucet off. Smooth out your sand in your stream table so it once again has a smooth all-around surface. Again, make sure the bottom 15 cm. of your stream table is empty enabling runoff.
7. Using your plastic spoon, gently press into the sand within your stream table to create a winding, meandering stream channel.
8. Once you have created your meandering stream channel, you may now begin a slow water flow once again by turning your faucet on. Make sure your tube is at the head of the stream. Observe the water flowing through your created stream channel. Draw what you see in the diagram box below in full detail and color. **(2 pts.)**
9. Cut off the water flow once again by turning the faucet off. Now place one of your miniature houses right along the edge of a cut-bank and place the other miniature house right along the edge of a point-bar deposit. **(2 pts.)**
   1. Which one of your houses should get destroyed and why? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Begin a slow, steady flow of water and at the same time, start your stopwatch. **(1 pt.)**

* 1. How much time did it take for a house to get destroyed? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Cut off your water flow once one of your houses gets flooded. **(1 pt.)**

* 1. What could you do to prevent this from happening in the future, perhaps during a potential flood? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Remove your miniature houses from your stream table and set them aside. You will need them again. It is now time to flood your stream; however there will be NO HORSEPLAY during this portion of the lab 🡪 remember your participation points are at stake!
2. Start off by creating a slow, steady flow of water and gently increase the rate of flow. Once the water floods your stream and progresses onto the surrounding flood plain, immediately cut off the water flow and allow for everything to settle.
3. Observe the natural levees created along the shoulders of the stream from sediment deposits following the flood. Draw what you see in the diagram box below in full detail and color. **(2 pts.)**
4. Place your miniature houses back at their initial locations within your stream bed and using your modeling clay, create artificial levees to help prevent destruction during the next flood.
5. Begin a slow, steady flow of water to your stream and gently increase the rate of flow once again. Observe how the artificial clay levee is preventing water from reaching your house this time. Draw what you see in the diagram box below in full detail and color. **(2 pts.)**
6. Remove the miniature houses and all clay from your stream table. Using your plastic spoon, level off all sand in your stream table. It should now look like it did when you first arrived at your lab station. Remember, leave the bottom 15 cm. of your stream table empty for runoff. You may also remove any propping objects you used to elevate the stream table.
7. Now, begin the ocean floor portion of the lab by retrieving 10 graph paper grids at the center lab station and keep them in a pile at your lab station, separated from your lab partner’s pile. Do not lose these since you will need these for each lab period after this one.
8. Observe your box at your lab station. DO NOT OPEN THE BOX! At the bottom of the box is a replica ocean basin feature on an unknown sea floor. Your goal is to successfully create a three dimensional representation of this ocean floor using a sounding rod device.
9. Find coordinate (1,0) on the box top. You will be skipping the first row (0).
10. Insert the sounding rod device into the hole at (1,0) until it comes in contact with the landform inside of the box.
11. Keeping the rod upright, hold your thumb and forefinger at the position on the sounding rod device where it came in contact with the box.
12. Slowly pull the rod out, keeping your thumb and forefinger at the position measured.
13. Using the metric ruler on the box top, measure the number of centimeters (cm) from the spot marked by your thumb and forefinger to the bottom of the sounding rod device. This number will be your depth reading.
14. On your first graph paper plotting grid, locate the (1,0) coordinate and count down the number of centimeters the sounding rod device measured. Plot this point on the grid.
15. Repeat this procedure across the row (1,1), (1,2), (1,3), etc. until (1,15).
16. Connect the depth points across the row and cut along this data line.
17. Fold your cut out along the dotted line (row 10) and glue on the appropriate row (row 1 for the example above) of the grid support 🡪 located on the last page of this lab report. You now have the first row of your three dimensional sea floor map. **(10 pts.)**
18. Repeat this procedure for:
    1. the second row coordinates (2,0), (2,1), (2,2) etc. until (2,15)
    2. the third row coordinates (3,0), (3,1), (3,2), etc. until (3,15)
    3. and so on … up to the tenth row coordinates (10,0), (10,1), (10,2) etc. until (10,15)
19. Use the following equation to answer the following problems: **(4 pts.)**

***depth = (echo time x speed of sound in water) / 2***

If a traveling ship sends a signal to the bottom of the ocean floor and it takes 12.6 seconds to return to that ship, what is the calculated depth to the ocean floor?

* 1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The ship moves to three other locations throughout its voyage and records the following echo sound times. Calculate the depth to the ocean floor using each time recorded.

Echo sounding time of 5.2 seconds:

* 1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Echo sounding time of 6.0 seconds:

* 1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Echo sounding time of 2.8 seconds:

* 1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Read the following information and use it to fill in the diagram below: **(5 pts.)**

*When data from a fathometer is analyzed, an amazing diversity of landforms common to all of the oceans can be discovered.  Throughout this lab you have been producing your own ocean floor representation, or bathymetric profile, and labeling these features.  Listed below you will find a brief introduction to some of the major features:*

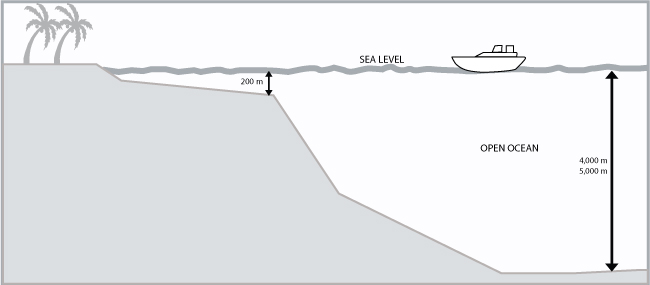
**CONTINENTAL SHELF** – This fairly flat surface extends from the beach out towards the open ocean.  This feature is a flooded extension of the continent.

**SHELF BREAK** – This is the point where the continental shelf breaks off and the slope steepens.

**CONTINENTAL SLOPE** – This relatively steep slope marks the true edge of the continent.

**CONTINENTAL RISE** – This feature occurs at the base of the continental slope and has a more gradual gradient.  It forms as sediment landslides down the steep continental slope and collects at the bottom, gradually thinning out until it disappears.

**ABYSSAL PLAIN** – This is the deepest portion of the ocean floor.  It is relatively flat and covered by a thin blanket of sediment that settles out of the ocean water.  Periodically, volcanic seamounts poke up out of the abyssal plain.

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**LAB QUESTIONS (1 pt. each) –** *Please write your answers in* ***COMPLETE SENTENCES****!*

1. Explain where the water cycle gets its energy from to continuously drive the cycle.

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1. Is water vapor gaining or losing energy during evaporation?

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1. How much evaporation is from the oceans? Where does the rest come from?

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1. What type of air can hold more water vapor, warm air or cold air?

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1. Explain entropy.

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1. Identify whether entropy is increasing or decreasing in the following scenarios:

Solid ice 🡪 liquid water: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Liquid water 🡪 water vapor: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Water vapor 🡪 solid ice: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Most precipitation falls in what form?

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1. What is a watershed and name the largest one in the United States?

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1. Describe the two main parts of a stream channel.

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1. Differentiate between the head and mouth of a stream. Identify the head and mouth of the Mississippi River.

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1. Name the three factors influencing a stream’s ability to erode.

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1. Explain the different forms a stream’s load can exhibit.

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1. What are the stages of a river’s life? Who developed a model showing this development?

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1. Describe meanders.

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1. Differentiate between cutbanks and point bars.

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1. What happens to the velocity of a stream as it begins to meander?

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1. Explain in detail how oxbow lakes are formed.

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1. Define terraces and identify in which stage of river development are they most common.

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1. What percentage of the water on the Earth is contained within the oceans?

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1. List the 5 subdivisions of the global ocean.

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1. What was the name of the giant ocean surrounding Pangaea approximately 250 MYA?

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1. Out of the five major oceans (subdivisions of the global ocean), which ones are growing larger?

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1. Explain how ocean water became salty? What are two main solids dissolved in ocean water?

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1. Describe salinity and explain the factors causing it to increase and decrease in ocean water.

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1. Which zone of ocean water has temperature dropping at faster rates than the other zones?

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1. Describe the two ways in which the ocean floor is studied.

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1. Name the three different types of marine life and identify their locales within the ocean.

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1. Differentiate between surface currents and deep currents.

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1. What three different factors influence the movement of surface currents?

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1. Explain the difference between El Nino and La Nina.

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**CONCLUSION (5 pts.) –** *Write a solid paragraph (at least 5 sentences) about your conclusions from the lab. Discuss the steps you went through during your lab experiment, what you accomplished, and how you tested your hypothesis. Also include what you learned as a result of this lab experiment.*

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